PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	10/712,005
Confirmation	:	7817
Applicant	:	D. Spanke
Filed	:	Nov. 14, 2003
Title	:	Level measuring device operating with microwaves
Art Unit	:	3662
Examiner	:	I. A. Alsomiri
Docket No.	:	SPAN3001C/FJD
Customer No.	:	23364

RESPONSE TO NOTICE OF NON-COMPLIANT APPEAL BRIEF

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is in response to the Notice of Non-Compliant Appeal Brief dated March 10, 2008.

The Brief on Appeal is being re-submitted with this paper. The fee for the Brief on Appeal was paid on December 26, 2006.

The status of the claims has been revised as noted by the Examiner.

Respectfully submitted,

Date: May 12, 2008

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

Applicant	:	Dietmar Spanke
Confirmation No	:	7817
Appl. No.	:	10/712,005
Art Unit	:	3662
Atty. Dkt. No.	:	SPAN3001C/FJD
Filed	:	November 14, 2003
Exr.	:	I. A. Alsomiri
Title	:	LEVEL MEASURING DEVICE OPERATING WITH MICROWAVES
Docket No.	:	SPAN3001 C/FJD
Customer No.	:	23364

BRIEF ON APPEAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

INTRODUCTORY COMMENTS

Pursuant to the provisions of 37 CFR 41.37, submitted herewith is Applicant/Appellant's Brief on Appeal.

Any additional fees necessary for this appeal may be charged to the undersigned's Deposit Account No. 02-0200

REAL PARTY IN INTEREST

(37 CFR 41.37(c)(1)(I)

The real party in interest is Applicant/Appellant's assignee, Endress + Hauser GmbH + Co. The assignment was recorded on July 21, 2004, at reel 014879 and Frame 0268.

RELATED APPEALS AND INTERFERENCES

(37 CFR 41.37(c)(1)(ii)

There are no related appeals or interferences with respect to the invention defined in this application.

STATUS OF CLAIMS

(37 CFR 41.37(c)(1)(iii)

Claims 1 - 13, 64 - 66, 73, 79 and 80 have been cancelled.

Claims 22, 23 and 67 - 71 have been withdrawn.

Claims 14 - 21, 24 -- 26, 28 - 41, 45 - 58, 61 - 66 and 72, 74 - 82 are finally rejected.

Claims 27, 42 - 44, 59 and 60 are objected to and indicated as containing allowable subject matter.

In view of the above, the claims under consideration in this appeal are, therefore, claims 14 - 21, 24 - 26, 28 - 41, 45 - 58, 61 - 63, 72, 74 - 78, 81 and 82. Of these claims, claims 14, 34, 56, 72 and 78 are in independent form.

STATUS OF AMENDMENTS
(37 CFR 41.37(c)(1)(iv)

No amendment was filed after issuance of the Advisory Action of July 18, 2006. A Request for Reconsideration with Amendment was filed on July 26, 2006 in response to the Office Action issued March 24, 2006. In this Request, claims 64 - 66, 73, 79 and 80 were cancelled and claims 14 - 63, 67 - 72, 81 and 82 were retained as previously presented.

SUMMARY OF CLAIMED SUBJECT MATTER
(37 CFR 41.37(c)(1)(v)

(References are to page and line(s) of the specification)

The invention relates to a level measuring device operating with microwaves (pg. 1, lines 5 and 6). A major disadvantage of such level measuring devices is the discrete design of both the envelope evaluation unit and the phase evaluation unit. Particularly because of the great share of analog devices, an increase in the pulse repetition rate of the transmit signal and/or a reduction of the measurement and evaluation cycle time, for example in order to increase measurement accuracy and/or the speed of evaluation, is only possible on a very small scale. To ensure sufficient accuracy of the transit time determined, each of the components used must both belong to a type class with small variances in component parameters and with high long-term stability, and must be wired with high accuracy and, consequently, at high cost (pg. 3, lines 14 - 23). According to the invention, then, accuracy to a centimeter is achieved even with large-scale integration using amplitude information and phase information. A significant increase in evaluating speed is achieved (pg 3, line 28 to pg. 4, line 3).

Claim 14 defines the level measuring device to include a transceiver unit 2 which is coupled to a transducer element 1. The transducer element 1 radiates or guides microwaves, in the form of microwave bursts, back and forth to the surface of a substance 201 (pg. 9, line 30 to pg. 10, line 4, and pg. 10, lines 14 - 17 and 19 - 22). A control unit 3 provides a measured value which is representative of the instantaneous level of the substance (pg. 9, lines 25 - 27). The repetition rate of the transmit signal generated by the transceiver unit is set at a range above 1 MHz and a center frequency at a range above 0.5 GHz, with the center frequency of the intermediate-frequency signal, represented by the finite sampling sequence in the control unit, above 50 kHz. (pg. 10, line 27 to pg. 11, line 4, and pg. 12, lines 11 - 21).

Claim 34 defines the level measuring device to also include a transceiver unit 2, a transducer unit 1 and a control unit 3. Claim 34 is similar to claim 14, except that claim 14 utilizes microwave bursts whereas claim 34 utilizes microwaves. That is the transmit signal is not generated from a burst sequence. (pg. 10, lines 8 - 17).

Claim 56 defines the level measuring device to also include a transceiver unit 2, a transducer unit 1 and a control unit 8. Claim 56 is similar to claims 14 and 34 in terms of defining the repetition rate, the center frequency of the transmit signal and the center frequency of the intermediate-frequency signal. It differs in that it further defines the transceiver unit and the control unit over both claims 14 and 34. Claim 56 utilizes microwave bursts. (Page 10, lines 19 - 25).

Claim 72 is similar to claim 56 except that microwave bursts are not utilized. Also, the signals in the control unit 3 are more specifically defined. A first quadrature signal sequence (Q) and a second quadrature-signal sequence (I) are identified as part of the intermediate-frequency signal (pg. 17, lines 5 - 11).

Claim 78 defines a method for determining a level of contents in a vessel including eight (8) specific steps starting with a mounting of the level measuring device, generating a transmit signal (S_2) delivered into the vessel, receiving the reflected signal (E_1) (echo waves) from the vessel and converting them to received signals (E_2), using these signals to generate level-dependent intermediate - frequency signals (2F), digitizing the intermediate-frequency signals to generate a finite sampling sequence (AF) which is stored in a volatile data memory, deriving from the finite sampling sequence a first quadrature signal sequence (Q) and a second-quadrature signal sequence (I) and using these quadrature signal sequences for generating the level value representing the level to be determined (pgs 9 - 22).

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL
(37 CFR 41.37(c)(1)(vi)

1) Claims14, 15, 21, 28 - 32, 34, 35, 47 - 55, 62 and 65 are finally rejected under 35 USC 102(a) as being anticipated by Lalla et al;

2) Claims 14 -16, 20, 21, 28 - 36, 47 - 58, 61 and 62 are finally rejected under 35 USC 103(a) as being unpatentable over Otto et al in view of Woodward et al and Lalla et al; and

3) Claims 17 - 19, 24 - 26, 37 - 41, 45, 46, 63, 72, 74 - 78, 81 and 82 are finally rejected under 35 USC 103(a) as being unpatentable over Otto et al in view of Woodward et al, Lalla et al and Fehrenbach et al.

These rejections are respectfully traversed.

ARGUMENT

(37 CFR 41.37(c)(1)(vii)

(1)

Claims 14, 15, 21, 28 - 32, 34, 35, 47 - 55, 62 and 65 are not anticipated by Lalla et al under 35 USC 102(a)

For a claim to be anticipated under 35 USC 102, it is necessary for each and every positively recited limitation to be found in a single reference, ***In re Bond***, 910 F.2d 831, 15 USPQ2d 1566 (Fed Cir. 1990) (In this case, the Lalla et al reference).

At a minimum, Lalla et al does not disclose the control unit as defined in independent claims 14 and 34. The control unit defined in claims 14 and 34, requires a volatile data memory for storing, at least temporarily, a finite sampling sequence currently representing the intermediate-frequency signal. This limitation is claimed and yet not found in Lalla et al. The examiner states that this limitation is found in the abstract of Lalla et al (see page 13 of the final rejection issued by the examiner). Referring to the abstract, however, does not support, it is respectfully submitted, the examiner's position. When referring to col. 5, lines 31 - 36 of Lalla et al, we see that the intermediate frequency signal ZF is generated at the output of the mixer 17, and that this is done to allow for a correctly timed sampling of the echo signal by the microwave pulses generated by the reference pulse generator. This is not the same as the structure defined by claims 14 and 34, and accordingly Lalla et al cannot anticipate claims 14 and 34.

(2)

Claims 14 - 16, 20, 21, 28 - 36, 47 - 58, 61 and 62 are not rendered unpatentable under 35 USC 103(a) over Otto et al in view of Woodward et al and Lalla et al

Neither Lalla et al, Woodward et al nor Otto et al teach a volatile memory (RAM) for storing a digitized intermediate frequency signal or a finite sampling sequence of the intermediate frequency signal having an intermediate frequency range above 50kHz. Woodward et al discloses no more than a transmit signal having a repetition rate above 1 MHz and center frequency (= microwave frequency) above 0.5 GHz. In col. 5, lines 49 - 58 of Lalla et al it is disclosed that the analogue intermediate frequency signal has to be demodulated by a demodulator 26, i.e., a rectifier. Consequently, only the analogue envelop signal is available at the input of the first subcircuit 27 (= sample & hold circuit 29 and AND converter 31), but not an analogue intermediate frequency signal having an intermediate frequency above 50kHz. Therefore, only a finite sampling sequence of the envelope signal can be stored. A finite sampling sequence of the intremediate frequency signal according to the present invention cannot be stored because such a finite sampling sequence of the intermediate frequency signal does not exist in the Lalla et al guage. Otto et al also does not disclose or suggest the use of a digitized intermediate frequency signal.

None of the references of record disclose the use of a finite sampling sequence of the intermediate frequency signal stored within a volatile data memory in a level gauge according to the pulse radar principle. To extrapolate from Otto et al and Lalla et al the use of a digitized intermediate frequency signal for level measuring instead of a digitized envelop signal can only be done by applying the teaching of the present invention, and that is

impermissible.

In the Advisory Action dated July 18, 2006, the examiner addressed the above argument by stating that "...Lalla teaches the 'the frequency of the intermediate frequency signal is below 100 kHz (col. 5, lines 44 - 45)," and that "...from figure 2 of Otto ...the mixer 38 produces the IF signal which is digitized and stored in a volatile data memory 50; also, generates the IF signal and stores it in a volatile data memory (col. 6, lines 6-7)."

Claims must be considered in their entirety. That is, all elements of the claim must be considered, not in isolation but as they interrelate to each other to form the whole. See, ***In re Wright***, 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988), ***In re Dillon***, 919 F .2d 688, 16 USPQ2d 1897 (Fed, Cir 1990) for obviousness rejections. The application of the references as the examiner proposes in the noted Advisory Action ignores, it is respectfully submitted, the noted principle of considering claims in their entirety.

(3)

Claims 17 - 19, 24 - 26, 37 - 41, 45, 46, 63, 72, 74 - 78, 81 and 82 are not rendered unpatentable under 35 USC 103(a) over Otto et al in view of Woodward et al, Lalla et al and Fehrenbach et al

The discussion above regarding the combination of Otto et al, Woodward et al and Lalla et al applies here as well. In addition, Fehrenbach et al has been discussed in deatil on pages 2 - 3 of the specification of the present application. The disadvantage of the device disclosed in Fehrenbach et al, and noted in this application, is not, it is respectfully submitted, cured by its combination with Otto et al, Woodward et al and Lalla et al. It simply does not provide the accuracy needed.

CONCLUSION

The cases cite above, reflect the state of the law for purposes of the rejections under 35 USC 102 and 103 in his appeal. Claim 14, for example has been rejected both under 35 USC 102 and 103. The examiner states with respect to Lalla et al (under which claim 14 is rejected under 35 USC 102) that "the frequency of the intermediate frequency signal is below 100 kHz." Even assuming the accuracy of this position, it must be understood that this limitation is not the only limitation recited in claim 14. Are the other limitations of claim 14 also found in Lalla? We think not. It was stated, and is again repeated, that in Lalla et al only a finite sampling sequence of the intermediate frequency of the envelope signal can be stored. This alone makes a difference. Then as to 35 USC 103, we see no compulsion to combine the references suggested by the examiner to solve the particular problem addresses by the present invention. It is not enough that they relate to the same general field. The teaching must be more specific.

In view of the above, it is respectfully submitted that claims 14 - 21, 24 - 26, 28 - 41, 45 - 58, 61 - 63, 72 - 78, 81 and 82 should also be allowed

Respectfully submitted,
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Date: May 12, 2008

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CLAIM APPENDIX
(37 CFR 41.37(c)(1)(viii)

Claims 1-13 (Canceled)

Claim 14. (Previously presented) A level measuring device, for producing a level value representative of a level in a vessel, said level measuring device operating with microwave bursts, comprising:

a transceiver unit for generating a level-dependent intermediate-frequency signal by means of a transmit signal and a receive signal, said transmit signal being generated from a burst sequence;

a transducer element which in operation couples transmitted microwaves into the vessel under control of the transmit signal and which converts echo waves reflected from the contents of the vessel into the receive signal; and

a control unit with a volatile data memory for storing, at least temporarily, a finite sampling sequence currently representing the intermediate-frequency signal, wherein:

a repetition rate of said transmit signal is set at a range above 1 MHz and a center frequency of said transmit signal is set at a range above 0.5 GHz, and

a center frequency of said intermediate-frequency signal lies above 50 kHz.

Claim 15. (Previously presented) The level measuring device as set forth in claim 14, which determines the level value by means of amplitude information derived from the sampling sequence.

Claim 16. (Previously presented) The level measuring device as set forth in claim 14, which determines the level value by means of phase information derived from the sampling sequence.

Claim 17. (Previously presented) The level measuring device as set forth in claim 14, wherein the volatile data memory holds, at least temporarily, a first signal sequence, which represents a numerically performed multiplication of the sampling sequence by a digital sine-wave signal sequence.

Claim 18. (Previously presented) The level measuring device as set forth in claim 17, wherein the volatile data memory holds, at least temporarily, a first quadrature-signal sequence, which represents a numerically performed down conversion of at least a portion of the first signal sequence.

Claim 19. (Previously presented) The level measuring device as set forth in claim 18, wherein the volatile data memory holds, at least temporarily, a first average - value sequence, which serves in particular to generate the

first quadrature - signal sequence.

Claim 20. (Previously presented) The level measuring device as set forth in claim 14, wherein the volatile data memory holds, at least temporarily, a digital phase sequence which corresponds to a temporal phase variation of at least a portion of the intermediate - frequency signal.

Claim 21. (Previously presented) The level measuring device as set forth in claim 14, wherein the volatile data memory holds, at least temporarily, a digital envelope which represents a temporal amplitude variation of the intermediate - frequency signal.

Claim 22. (Withdrawn) A level measuring device for producing a level value representative of a level in a vessel, said level measuring device operating with microwave bursts, comprising:

a transceiver unit for generating a level-dependent intermediate-frequency signal by means of a transmit signal and a receive signal;

a transducer element which in operation couples waves, into the vessel under control of the transmit signal and which converts echo waves reflected from the contents of the vessel into the receive signal; and

a control unit with a volatile data memory, said volatile data memory storing, at least temporarily, a finite sampling sequence currently representing

the intermediate frequency signal, a first signal sequence, which represents a numerically performed multiplication of the sampling sequence by a digital sine-wave signal sequence, and a second signal sequence, which represents a numerically performed multiplication of the sampling sequence by a digital cosine-wave signal sequence.

Claim 23. (Withdrawn) The level measuring device as set forth in claim 22, which comprises a logarithmic amplifier for the intermediate-frequency signal.

Claim 24. (Previously presented) The level measuring device as set forth in claim 17, wherein the volatile data memory holds, at least temporarily, a second signal sequence, which represents a numerically performed multiplication of the sampling sequence by a digital cosine-wave signal sequence.

Claim 25. (Previously presented) The level measuring device as set forth in claim 18, wherein the volatile data memory holds, at least temporarily, a second signal sequence, which represents a numerically performed multiplication of the sampling sequence by a digital cosine-wave signal sequence, and wherein the volatile data memory holds, at least temporarily, holds a second quadrature - signal sequence, which represents a numerically performed down conversion of at least a portion of the second signal

sequence.

Claim 26. (Previously presented) The level measuring device as set forth in claim 24, wherein the volatile data memory holds, at least temporarily, a quadrature - signal sequence, which represents a numerically performed down conversion of at least a portion of the second signal sequence.

Claim 27. (Previously presented) The level measuring device as set forth in claim 19, wherein the volatile data memory holds, at least temporarily, a second average-value sequence, which serves in particular to generate the second quadrature signal sequence and represents a variation of a time average of at least a portion of the second signal sequence.

Claim 28. (Previously presented) The level measuring device as claimed in claim 14, wherein the transducer element couples pulsed waves into the vessel.

Claim 29. (Previously presented) the level measuring device as claimed in claim 14, wherein the transmit signal is a burst sequence having a center frequency lying in a range between 0.5 GHz and 30 GHz.

Claim 30. (Previously presented) The level measuring device as claimed in claim 14, wherein the transmit signal is a burst sequence having a center

frequency lying above 30 GHz.

Claim 31. (Previously presented) The level measuring device as claimed in claim 14, wherein the transmit signal is a burst sequence having a repetition rate being set at a range between 1 MHz and 10 MHz.

Claim 32. (Previously presented) The level measuring device as claimed in claim 14, wherein the transmit signal is a burst sequence having a repetition rate lying above 10 MHz.

Claim 33. (Previously presented) The level measuring device as set forth in claim 14, which comprises a logarithmic amplifier for the intermediate-frequency signal.

Claim 34. (Previously presented) A level measuring device for producing a level value representative of a level in a vessel, said level measuring device operating with microwaves, comprising:

a transceiver unit for generating a level-dependent intermediate-frequency signal by means of a transmit signal and a receive signal;

a transducer element coupling pulsed microwaves into the vessel under control of the transmit signal, and converting echo waves reflected from the contents of the vessel into the receive signal; and

a control unit with a volatile data memory for storing, at least temporarily, a finite sampling sequence currently representing the intermediate-frequency signal, wherein a repetition rate of said transmit signal is set at a range above 1 MHz and a center frequency of said transmit signal is set at a rage above 0.5 GHz, and a center frequency of said intermediate-frequency signal lies above 50 kHz.

Claim 35. (Previously presented) The level measuring device as set forth in claim 34, which determines the level value by means of amplitude information derived from the sampling sequence.

Claim 36. (Previously presented) The level measuring device as set forth in claim 34, which determines the level value by means of phase information derived from the sampling sequence.

Claim 37. (Previously presented) The level measuring device as set forth in claim 34, wherein the volatile data memory holds, at least temporarily, a first signal sequence representing a numerically performed multiplication of the sampling sequence by a digital sine-wave signal sequence.

Claim 38. (Previously presented) The level measuring device as set forth in claim 37, wherein the volatile data memory holds at least temporarily, a second signal sequence representing a numerically performed multiplication of

the sampling sequence by a digital cosine-wave signal sequence.

Claim 39. (Previously presented) The level measuring device as set forth in claim 37, wherein the volatile data memory holds, at least temporarily, a first quadrature-signal sequence, which represents a numerically performed down conversion of at least a portion of the first signal sequence.

Claim 40. (Previously presented) The level measuring device as set forth in claim 38, wherein the volatile data memory holds, at least temporarily a first quadrature-signal sequence, which represents a numerically performed down conversion of at least a portion of the first signal sequence, and wherein the volatile data memory holds, at least temporarily, a second quadrature-signal sequence, which represents a numerically performed down conversion of at least a portion of the second signal sequence.

Claim 41. (Previously presented) The level measuring device as set forth in claim 39, wherein the volatile data memory holds, at least temporarily, a first quadrature-signal sequence, which represents a real part of said intermediate frequency signal, and a second quadrature-signal sequence, which represents an imaginary part of said intermediate-frequency signal.

Claim 42. (Previously presented) The level measuring device as set forth in claim 40, wherein the volatile data memory holds, at least temporarily,

a data record which corresponds to a phase of a data record of the sampling sequence and represents a numerical division of a data record selected from the first quadrature - signal sequence by data record selected from the second quadrature - signal sequence, said data record selected from the first quadrature-signal sequence having an index of essentially equal with an index of said data record selected from the second quadrature-signal sequences.

Claim 43. (Previously presented) The level measuring device as set forth in claim 38 wherein the volatile data memory holds, at least temporarily, a first average value sequence, which represents a variation of a time average of at least a portion of the first signal sequence and a second average-value sequence, which represents a variation of a time average of at least a portion of the second signal sequence.

Claim 44. (Previously presented) The level measuring device as set forth in claim 43, wherein the first average-value sequence serves to generate the first quadrature-signal sequence, and wherein the second average -value sequence serves to generate the second quadrature - signal sequence.

Claim 45. (Previously presented) The level measuring device as set forth in claim 34, wherein the volatile data memory holds, at least temporarily, a first digital phase sequence which corresponds to a temporal phase variation of at least a portion of the intermediate-frequency signal.

Claim 46. (Previously presented) The level measuring device as set forth in claim 45, wherein the volatile data memory holds, at least temporarily, a second digital phase sequence which corresponds to a temporal phase variation of at least a portion of the intermediate frequency signal.

Claim 47. (Previously presented) The level measuring device as set forth in claim 34, wherein the volatile data memory holds, at least temporarily, a digital envelope representing a temporal amplitude variation of the intermediate-frequency signal.

Claim 48. (Previously presented) The level measuring device as claimed in claim 34 wherein the transducer element couples pulsed waves into the vessel.

Claim 49. (Previously presented) The level measuring device as claimed in claim, 34 wherein the transmit signal is a burst sequence having a center frequency and a repetition rate.

Claim 50. (Previously presented) The level measuring device as set forth in claim 34, which comprises a logarithmic amplifier for the intermediate-frequency signal.

Claim 51. (Previously presented) The level measuring device as claimed

in claim 34, wherein the transmit signal is a burst sequence having a center frequency lying in a range between 0.5 GHz and 30 GHz.

Claim 52. (Previously presented) The level measuring device as claimed in claim 34 wherein the transmit signal is a burst sequence having a center frequency lying above 30 GHz.

Claim 53. (Previously presented) The level measuring device as claimed in claim 34 , wherein the transmit signal is a burst sequence having a repetition rate being set at a range between 1 MHz and 10 MHz.

Claim 54. (Previously presented) The level measuring device as set forth in claim 34, wherein the transmit signal is a burst sequence having a repetition rate lying above 10 MHz.

Claim 55. (Previously presented) The level measuring device as set forth in claim 34, wherein the transceiver unit comprises a mixer delivering the intermediate - frequency signal.

Claim 56. (Previously presented) A level measuring device operating with microwaves for producing a level value representative of a level in a vessel, said level measuring device comprising:

a transceiver unit for generating a level-dependent

intermediate-frequency signal by means of a transmit signal and a receive signal, said transmit signal is a sequence of bursts laving a predetermined center frequency and a predetermined repetition rate, said intermediate-frequency signal having a center frequency corresponding with said center frequency of said transit signal;

a transducer element coupling pulsed microwaves into the vessel under control of the transmit signal, and converting echo waves reflected from the contents of the vessel into the receive signal; and

a control unit with an analog-to-digital converter and with a digital level computer, said analog-to-digital converter being coupled to an output of the transceiver unit providing said intermediate-frequency signal, and said analog-to-digital converter providing said digital level computer with a digital intermediate-frequency signal, wherein:

the digital level computer derives said level value by using said digital intermediate frequency signal;

a repetition rate of said transmit signal is set at a range about 1 MHz; a center frequency of said transmit signal is set at a range above 0.5 GHz; and

a center frequency of said intermediate-frequency signal lies above 50 kHz.

Claim 57. (Previously presented) The level measuring device as claimed in claim 56, wherein the control unit comprises a volatile data memory for

storage, at least temporarily, a finite sampling sequence currently representing the intermediate - frequency signal.

Claim 58. (Previously presented) The level measuring device as set forth in claim 56, which comprises a logarithmic amplifier for the intermediate-frequency signal generated by the transceiver unit, said logarithmic amplifier being coupled to said analog-to-digital converter.

Claim 59. (Previously presented) The level measuring device as set forth in claim 25, wherein the volatile data memory holds, at least temporarily, a second average-value sequence, which serves in particular to generate the second quadrature signal sequence and represents a variation of a time average of at least a portion of the second signal sequence.

Claim 60. (Previously presented) The level measuring device as set forth in claim 25, wherein the volatile data memory holds, at least temporarily, a data record which corresponds to a phase of a data record of the sampling sequence and represents a numerical division of a data record of the first quadrature-signal sequence by an essentially equal-locus data record of the second quadrature-signal sequence.

Claim 61. (Previously presented) The level measuring device as set forth in claim 14, further comprising:

a communications unit for sending measuring data to a remote area.

Claim 62. (Previously presented) The level measuring device as set forth in claim 14, wherein:

said transceiver unit includes a mixer circuit which outputs an intermediate - frequency signal for delivery to said control unit.

63. (Previously presented) The level measuring device as set forth in claim 14 wherein the volatile data memory holds, at least temporarily, a first quadrature-signal sequence, which represents a real part of said intermediate-frequency signal, and a second quadrature-signal sequence, which represents a imaginary part of said intermediate-frequency signal.

64. (Previously presented) The level measuring device as set forth in claim 14 which determines the level value by means of phase information derived from the sampling sequence.

65. (Previously presented) The level measuring device as set forth in claim 14 which determines the level value by means of amplitude information derived from the sampling sequence.

66. (Previously presented) The level measuring device as set forth in claim 14 which comprises a logarithmic amplifier for the

intermediate-frequency signal.

67. (Withdrawn) The level measuring device as set forth in claim 22 wherein a repetition rate of said transmit signal is set at a range above 1 MHz and a center frequency of said transmit signal is set at a range above 0,5 GHz and wherein a center frequency of said intermediate-frequency signal lies above 50 kHz.

68. (Withdrawn) The level measuring device as claimed in claim 67 wherein the repetition rate of said transmit signal is set at a range between 0.5 GHz and 30 GHz.

69. (Withdrawn) The level measuring device as claimed in claim 67 wherein the transmit signal is a burst sequence having a center frequency lying above 30 GHz.

70. (Withdrawn) The level measuring device as claimed in claim 67 wherein the center frequency of said transmit signal is set at a range between 1 MHz and 10 MHz.

71. (Withdrawn) The level measuring device as claimed in claim 67 wherein the center frequency of said transmit signal is set at a range above 10 MHz.

72. (Previously presented) A level measuring device for producing a level value representative of a level in a vessel said level measuring device operating with microwaves, and said level measuring device comprising:

a transceiver unit for generating a level-dependent intermediate-frequency signal by means of a transmit signal and a receive signal;

a transducer element which in operation couples pulsed waves into the vessel under control of the transmit signal and which converts echo waves reflected from contents of the vessel into the receive signal; and

a control unit with a volatile data memory, said volatile data memory storing, at least temporarily, a finite sampling sequence currently representing the intermediate-frequency signal, a first quadrature-signal sequence, which represents a real part of said intermediate-frequency signal, and a second quadrature-signal sequence, which represents a imaginary part of said intermediate-frequency signal, wherein:

a repetition rate of said transmit signal is set at a range about 1 MHz; a center frequency of said transmit signal is set at a range above 0.5 GHz; and

a center frequency of said intermediate-frequency signal lies above 50 kHz.

73. (Previously presented) The level measuring device as set forth in claim 72 wherein a repetition rate of said transmit signal is set at a range

above 1 MHz and a center frequency of said transmit signal is set at a range above 0,5 GHz and wherein a center frequency of said intermediate-frequency signal lies above 50 kHz.

74. (Previously presented) The level measuring device as claimed in claim 72 wherein the repetition rate of said transmit signal is set at a range between 0.5 GHz and 30 GHz.

75. (Previously presented) The level measuring device as claimed in claim 72 wherein the transmit signal is a burst sequence having a center frequency lying above 30 GHz.

76. (Previously presented) The level measuring device as claimed in claim 72 wherein the center frequency of said transmit signal is set at a range between 1 MHz and 10 MHz.

77. (Previously presented) The level measuring device as claimed in claim 72 wherein the center frequency of said transmit signal is set at a range above 10 MHz.

78. (Previously presented) A method for determining a level of contents in a vessel, said method comprising the steps of:

mounting a level measuring device on said vessel, said level measuring

device comprising a control unit, which includes a volatile data memory, a transducer element, said transducer element being adapted to couple microwaves into the vessel and said transducer element being adapted to receive microwaves reflected from said contents, a transceiver unit adapted to provide said control unit with a level-dependent intermediate-frequency signal;

generating a transmit signal and transferring said transmit signal to said transducer element;

using said transducer element to couple, under control of said transmit signal, pulsed microwaves into the vessel;

receiving from said vessel echo waves, which correspond with said microwaves coupled into the vessel, and using said transducer element to convert said echo waves into a receive signal;

using said transmit signal and said receive signal to generate said level-dependent intermediate-frequency signal;

digitizing said intermediate-frequency signal for generating a finite sampling sequence currently representing the intermediate-frequency signal, and storing said finite sampling sequence into said volatile data memory;

deriving from said finite sampling sequence a first quadrature-signal sequence and a second quadrature-signal sequence, said first quadrature-signal sequence representing a real part of said intermediate-frequency signal, and said second quadrature-signal sequence representing an imaginary part of said intermediate-frequency signal; and

using said first and second quadrature-signal sequences for generating

a level value representative of said level to be determined. wherein:

a repetition rate of said transmit signal is set at a range about 1 MHz; a center frequency of said transmit signal is set at a range above 0.5 GHz; and

a center frequency of said intermediate-frequency signal lies above 50 kHz.

79. (Previously presented) The method as claimed in claim 78, wherein a repetition rate of said transmit signal is set at a range above 1 MHz and a center frequency of said transmit signal is set at a range above 0,5 GHz.

80. (Previously presented) The method as claimed in claim 79, wherein a center frequency of said intermediate-frequency signal lies above 50 kHz.

81. (Previously presented) The method as claimed in claim 78, further comprising steps of using said first and second quadrature-signal sequences for generating a digital envelop representing an amplitude variation of said intermediate-frequency signal, and using said digital envelop for generating said level value.

82. (Previously presented) The method as claimed in claim 78, further comprising steps of using said first and second quadrature-signal sequences to generate a phase value representing a phase of said receive signal relative to said transmit signal and, and using said digital envelop for generating said level value.

EVIDENCE APPENDIX

There is no evidence being relied upon which was submitted pursuant to 37 CFR 1.130, 1.131 or 1.132.

RELATED PROCEEDINGS APPENDIX

There is no related proceeding being relied upon.

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